



Rules and Regulations L2 Competition #1

(Please read these rules and regulations carefully)

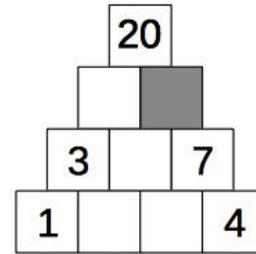
1. Please fill in your FULL name, grade, campus and student ID clearly on the answer sheet, and on the top of this page.
2. Do not open the question booklet until you are told to do so. You may only use a pencil when answering the questions.
3. No calculators or unauthorised electronic devices (including mobile phones) are allowed during the contest.
4. Strict silence must be observed at all times in the examination hall and please be reminded that you MAY NOT leave your seat without permission.
5. If you have any request or enquiry, please raise your hand and wait for an invigilator.
6. Only one candidate is allowed to leave the hall at a time. You are required to return to the hall within 10 minutes or else you will automatically be disqualified from the contest.
7. Each question in the contest has been verified by experienced trainers, thus no further explanation will be given.
8. The time allowed for the paper is 45 minutes. You must stop writing when you are told to do so.
9. You MUST fill in your answer in the answer sheet provided as you walked into the contest room. You will not be awarded marks for any answer written in the question booklet.

Scoring System

1. The correct answers to problems 1 to 10 will be awarded 1 point each. The correct answers to problems 11 to 15 will be awarded 2 points each. The total number of marks is 20 points. You will not be penalized for each incorrect answer.
2. The organizer reserves the right to call for a re-sit in the event of malpractice and to differentiate between those outstanding students.
3. Contestants who are disqualified from the contest will not be awarded any certificates and will be forfeited any right to re-sit this year.

Part I Questions 1 – 10, 1 point each

1. Isabelle writes the numbers in the diagram so that each number is the sum of the two numbers below it. What number will Isabelle write in the shaded cell?

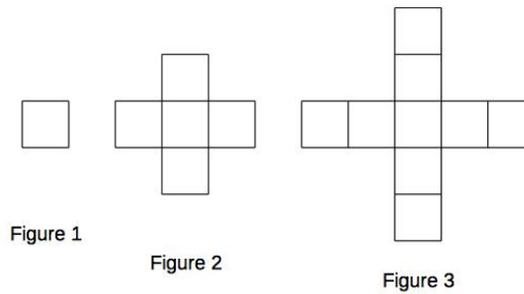


- A) 9 B) 12 C) 14 D) 16

Answer: B

Solution: Start filling in the bottom row and work your way up. The bottom row is 1, 2, 3, 4. The second row is 3, 5, 7. The third row is 8, 12.

2. In the sequence shown, how many squares will form Figure 2018?



- A) 8068 B) 8069 C) 8072 D) 8073

Answer: B

Solution: Each figure adds four squares to the previous figure. Thus the 2018th figure has $1 + 4 + 4 + \dots + 4 = 1 + 2017 \cdot 4 = 8069$ squares.

3. The temperature in Winnipeg is $5\frac{5}{16}$ degrees colder than the temperature in Vancouver. The temperature in Vancouver is $8\frac{3}{8}$ degrees warmer than the temperature in Ottawa. The temperature in Ottawa is $2\frac{1}{4}$ degrees colder than the temperature in Halifax. The temperature in Halifax is 16. What is the temperature in Winnipeg?

- A) $16\frac{1}{16}$ B) $16\frac{13}{16}$ C) $17\frac{7}{16}$ D) $17\frac{15}{16}$

Answer: B

Solution: $16 - 2\frac{1}{4} + 8\frac{3}{8} - 5\frac{5}{16} = 16\frac{13}{16}$

4. In Ms. Smith's grade 5/6 class, the average height of the grade 5's is 140 cm and the average height of the grade 6's is 150 cm. The average height of all students is 144 cm. There are 15 students in grade 5. How many grade 6 students are in Ms. Smith's class?

- A) 8 B) 9 C) 10 D) 12

Answer: C

Solution: Let x be the number of grade 6 students.

Average height = $(140 \cdot 15 + 150 \cdot x) / (15 + x) = 144$

Solving for x: $x = 10$.

5. Clare put 2 roses, 2 daffodils, and 3 daisies in a vase. If Clare takes two flowers out at random, what is the probability that they are both daisies?

- A) $\frac{1}{7}$ B) $\frac{2}{21}$ C) $\frac{3}{14}$ D) $\frac{3}{7}$

Answer: A

Solution: $P = \text{preferred options} / \text{total options} = 3C2 / 7C2 = \frac{3}{21} = \frac{1}{7}$

6. In an abandoned house, the leaky kitchen faucet drips every 70 minutes and the leaky bathroom faucet drips every 105 minutes. They dripped at the same time at 4:36 pm. When is the next time both the kitchen and bathroom faucets will drip together?

A) 5:11 pm B) 7:06 pm C) 7:36 pm D) 8:06 pm

Answer: D

Solution: $\text{LCM}(70,105) = 2 \cdot 3 \cdot 5 \cdot 7 = 210 \text{ minutes} = 3.5 \text{ hours}$.

$4:36 + 3 \text{ hours}, 30 \text{ minutes} = 8:06 \text{ pm}$

7. At Brandon's Annual Bicycle Sale, all bicycles are 40% off. Nicole finds a bicycle she would like to buy, but notices that the paint is chipped on one side. Brandon says he will give her an extra 10% discount on the sale price, so Nicole decides to buy it. What percentage of the original retail price did Nicole pay for the bicycle?

A) 44% B) 50% C) 54% D) 60%

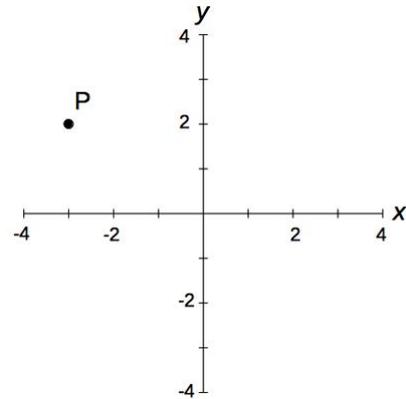
Answer: C

Solution: Suppose the bicycle costs \$100 (without loss of generality).

40% off: $100 - 100 \cdot 0.4 = 60$. Taking an additional 10% off $\Rightarrow 60 - 60 \cdot 0.1 = 54$.

Therefore, Nicole paid $54/100 = 54\%$ of the original retail price.

8. In the diagram, what will the coordinates of point P be after it is reflected about the x axis and then reflected about the y axis?



- A) (-3, 2) B) (3, -2) C) (2, -3) D) (-3, -2)

Answer: B

Solution: The coordinates of point P is (-3, 2). After reflecting about the x axis, the coordinates are (-3, -2). Then reflecting this point about the y axis gives the new coordinates (3, -2).

9. My fish tank is one-sixth full. When I add 12 litres, the tank is half full. How many litres does the fish tank hold?

- A) 24 L B) 32 L C) 36 L D) 42 L

Answer: C

Solution: Let x be the volume of water that the fish tank holds.

$$x/6 + 12 = x/2$$

$$12 = x/3$$

$$x = 36$$

10. Ethan and David are driving directly towards each other. Ethan is driving at a constant speed of 50 km/h. David is driving at a constant speed of 70 km/h. If they are 160km apart, how much time will pass before they meet?

- A) 1 h 10 min B) 1 h 15 min C) 1 h 20 min D) 1 h 33 min

Answer: C

Solution: When Ethan and David are driving directly towards each other at constant speeds of 50 km/h and 70 km/h respectively, then the distance between them is decreasing at a rate of $50 + 70 = 120$ km/h.

If Ethan and David are 160 km apart and the distance between them is decreasing at 120 km/h, then they will meet after $160/120$ h or $1 \frac{1}{3}$ h. Since $\frac{1}{3}$ h = 20 minutes, so the answer is 1 h 20 min.

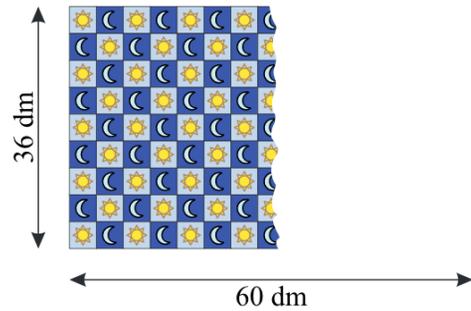
Part II Questions 11 – 15, 2 points each

1. Alyssa's analog alarm clock rings at the first time after 7:10am when the hour and minute hands no longer form an obtuse angle. At what time does Alyssa's alarm clock ring?
- A) 7:20 am B) 7:21 am C) 7:22 am D) 7:23 am

Answer: C

Solution: The hour hand moves at $\frac{1}{2}^\circ/\text{min}$ and $30^\circ/\text{hour}$. The hour hand at 7:22 is at $\frac{1}{2}^\circ * 22 + 30^\circ * 7 = 221^\circ$. The minute hand moves at $6^\circ/\text{min}$. The minute hand at 7:22 is at $6^\circ * 22 = 132^\circ$. The difference in angles is $221^\circ - 132^\circ = 89^\circ$ and thus it is no longer obtuse.

2. Peter bought a carpet 36 dm wide and 60 dm long. The carpet has a pattern of small squares containing either a sun or a moon, as can be seen in the figure. You can see that along the width there are 9 squares. When the carpet is fully unrolled, how many moons can be seen?



- A) 68 B) 67 C) 65 D) 63

Answer: B

Solution: Since there are 9 squares along the width, so each square is $36/9=4\text{dm}$. There are $60/4 = 15$ squares along the length.

Row started with Sun: 8 Suns and 7 Moons.

Since there are five rows started with Sun, so there would be $7 \times 5=35$ Moons.

Row started with Moon: 8 Moons and 7 Suns: Since there are four rows started with Sun, so there would be $8 \times 4=32$ Moons.

To sum up, there are $35+32=67$ Moons can be seen when the carpet is fully unrolled.

3. Catherine is reading a story book, she read $1/9$ of the book on the first day. She read 24 pages on the second day. The ratio of the pages she read in the past two days to the remaining pages of the book is 1: 4, how many pages are there in the story book she is reading?

- A) 180 B) 270 C) 360 D) 240

Answer: B

Solution: since $(x/9 + 24) : (x - (x/9 + 24)) = 1:4$,

$$\text{so } x - (x/9 + 24) = 4(x/9 + 24)$$

$$x = 270$$

4. Thomas had an average of 79% in science class. On his next test he scored 95%, and this raised his science average to 81%. On the test after this, his average fell to 80%. What was his mark on the last test?

A) 72% B) 74% C) 76% D) 78%

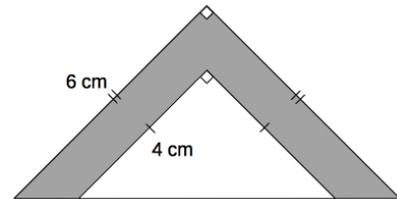
Answer: A

Solution: After Thomas scored 95% on the next test, his overall average raised to 81%. $95\% - 81\% = 14\%$, which needs to be evenly distributed ($81\% - 79\% = 2\%$) to the previous tests in order to raised her overall average to 81% as shown:

79%	79%	79%	79%	79%	79%	79%
+	+	+	+	+	+	+
2%	2%	2%	2%	2%	2%	2%

Thomas wrote eight tests so far. After he wrote the ninth test, his average fell to 80%, so he got $80\% \times 9 - 81\% \times 8 = 72\%$ on the last test.

5. The diagram to the right contains two isosceles right triangles with side lengths as labelled. What is the area of the shaded region?



A) 8 cm^2 B) 10 cm^2 C) 12 cm^2 D) 14 cm^2

Answer: B

Solution: The area of the larger triangle is $\frac{1}{2} \times 6 \times 6 = 18$.

The area of the smaller triangle is $\frac{1}{2} \times 4 \times 4 = 8$.

Therefore the area of the shaded region is $18 - 8 = 10 \text{ cm}^2$.